Testimony of

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Mr. Chairman, and members of the Committee, I appreciate the opportunity to appear before you today to discuss the Energy Information Administration's (EIA) analysis of the renewable electricity standard (RES) program included in Title I of the American Clean Energy and Security Act (ACESA) discussion draft issued by Chairman Waxman and Chairman Markey at the end of March 2009.

EIA is the independent statistical and analytical agency within the Department of Energy. We are charged with providing objective, timely, and relevant data, analyses, and projections for the use of the Congress, the Administration, and the public. Although we do not take positions on policy issues, we do produce data and analyses to help inform energy policy deliberations. Because we have an element of statutory independence with respect to this work, our views are strictly those of EIA and should not be construed as representing those of the Department of Energy or the Administration.

Baselines and Targets for Considering the RES in the ACESA Discussion Draft

Since I appeared before the Committee two months ago, EIA has updated its *Annual Energy Outlook 2009* (*AEO2009*) reference case to reflect the enactment of the American Recovery and Reinvestment Act (ARRA) in mid-February 2009.[1] ARRA provides significant new Federal funding, loan guarantees, and tax credits to stimulate investments in energy efficiency and renewable energy. The potential impact of the ARRA provisions on the projected use of renewable generation is large enough that an analysis of the RES program in the ACESA discussion draft that did not include ARRA in the

[1] Several other changes, including updates to near-term world oil prices, reinstatement of the Clean Air Interstate Rule, and final action on Corporate Average Fuel Economy standards for model year 2011, are also incorporated in the updated reference case.

reference case could provide misleading results. The updated reference case, which is documented in a report and model results available on EIA's website, is therefore used as the baseline for EIA's analysis of Title I of the ACESA discussion draft. **Figure 1** compares the projected use of nonhydro renewables in the updated reference case and the reference case published in March 2009, which does not include ARRA.

Because of provisions in the discussion draft that exempt small electricity sellers and sales of electricity from certain generation sources, such as existing hydroelectric power and municipal solid waste (MSW), from coverage by the RES, as well as provisions that may allow credits for qualified State energy efficiency programs to satisfy up to 20 percent of the RES requirement, the share of eligible renewables required to comply with the RES will be lower than the nominal target. **Figure 2** illustrates the derivation of the amount of renewables as a share of total electricity sales required when these exemptions and credits are taken into account. While the nominal share in 2025 is 25 percent, exempting the small retailers lowers the effective target to 22 percent of total electricity sales. The effective target is lowered further to 21 percent when the generation from hydroelectric power and municipal solid waste is removed from the sales baseline. If States are able to, and elect to, take full advantage of the energy efficiency credits, the effective share of renewables required could drop to approximately 17 percent of total electricity sales. Figure 2 also shows the use of RES-eligible renewables in the updated reference case, illustrating that the RES program targets in the ACESA discussion draft do not exceed the projected use of renewables until about 2020, with the exact date when the program is expected to become binding depending on the extent to which efficiency credits are used for compliance.

Since the baselines for and details of the yet-to-be-established Energy Efficiency Resource Standard (EERS) program are unknown, the extent to which States would have access to efficiency credits for purposes of the RES is not clear. In order to assess how different outcomes regarding the application of efficiency credits might affect the projected impacts of the RES, EIA modeled two RES policy cases. The RES with Full Efficiency Credits (RESFEC) case assumes that the maximum level of efficiency credits, up to one fifth of the credits in the target in any given year, are claimed. This is reflected as a 20-percent reduction in the applicable target for eligible renewable generation. The RES with No Efficiency Credits (RESNEC) case assumes that States cannot qualify for, or elect not to use, efficiency credits.

The quantitative results discussed in this testimony reflect modeling analysis of the RES provisions in the ACESA discussion draft on a standalone basis. Other proposed measures in the ACESA discussion draft, notably the EERS and a cap-and-trade program for greenhouse gas emissions, could interact with the RES and significantly alter its incremental impacts. A qualitative discussion of these linkages is provided following the discussion of the standalone RES modeling results.

Impact of an RES on the Generation Mix and Electricity Prices

Power sellers will turn to a mix of renewable fuels to comply with the RES, as shown in **Figure 3**. In absolute terms, the key fuels are projected to be biomass and wind, but other renewable fuels including solar and geothermal are also projected to grow significantly in percentage terms.

Most of the projected increase in wind generation is due to existing State RES programs and the passage of ARRA. This occurs in both the reference case and the RES cases. Total wind generation in the two RES cases is projected to increase from 32 billion kilowatthours in 2007 to between 208 billion kilowatthours and 249 billion kilowatthours in 2030. Total biomass generation increases from 39 billion kilowatthours in 2007 to between 438 billion kilowatthours and 577 billion kilowatthours in 2030 in the two RES cases.

The higher renewable generation stimulated by the RES leads to lower coal and natural gas generation. In the two RES cases, coal generation ranges between 182 billion kilowatthours (8 percent) and 257 billion kilowatthours (11 percent) below the reference case level. Similarly, natural gas generation in the two RES cases in 2030 is between 55 billion kilowatthours (6 percent) and 150 billion kilowatthours (15 percent) below the level projected in the reference case.

Given the amount of eligible renewable generation projected in the reference case, the RES is not expected significantly to affect national average electricity prices until after 2020. As the required RES share increases to its maximum value in 2025, the value of RES credits increases and impacts on national average electricity prices become evident. The peak effect on national average electricity prices is 2.7 percent in the RESFEC case and 2.9 percent in the RESNEC case. The effect on national average electricity prices then falls, as the impact of the RES requirement on the cost of coal and natural gas, fuels whose use is reduced by added renewables, is increasingly reflected in electricity prices. By 2030, electricity prices are projected to be little changed from the reference case in both RES cases, with 2030 prices less than 1 percent higher than in the reference case.

There may be significant regional variation in price impacts, resulting from both differences in renewable resource availability and cost, as well as differences in how those costs are allocated to consumers. Projected regional price impacts are discussed later in the testimony.

Because of the level of renewables projected in the reference case, renewable credit prices are zero in the early years of the RES program. Credit prices turn positive around 2020, rise to the 5-cent-per-kilowatthour cap in 2024, and then start to fall a few years before 2030.

Impact of an RES on Carbon Dioxide Emissions

The impact of an RES on carbon dioxide emissions largely depends on the fuels and generators being displaced--carbon dioxide reductions are significantly larger when coal is displaced than when natural gas is displaced. Certain renewables, such as biomass co-firing at existing plants, directly displace coal use. Other increases in renewable generation will generally displace the marginal (most costly) generation source that would otherwise be used to meet customer load whenever the renewable generation source is available. In EIA's standalone analysis of the RES program included in the ACESA discussion draft, the increased use of renewables stimulated by the RES leads to lower electricity sector carbon dioxide emissions. Electricity sector carbon dioxide emissions in 2030 are between 195 million metric tons (7 percent) and 306 million metric tons (12 percent) below the reference case level in the two RES cases.

Regional Impacts of an RES

Compliance with RES targets can vary significantly by region. Although all regions provide some significant fraction of their required renewable generation from in-region sales, some tend to over-comply, and thus are able to sell credits to other regions, and other regions tend to under-comply, and need to purchase credits to achieve compliance. Several factors contribute to a region's overall tendency to be a net Renewable Electricity Credit (REC) importer or exporter, including:

- Cost and availability of renewable resources – regions with low-cost and/or abundant resources may be able to comply more economically or to a greater extent than other regions. Some regions may also be able to access lower cost resources in an adjacent region, with additional investment in transmission improvements.
- Cost of alternative generation options – regions that rely on more expensive conventional generation options, such as natural gas, will see reduced compliance costs, even with relatively expensive or limited renewable resources, since REC prices are a function of the spread between the cost of the renewable and the cost of the displaced generation.
- State incentives for renewable generation – some regions may have state RES requirements in excess of the net Federal requirement for that region, and as a result will necessarily over-comply with the Federal RES.

Because of regional differences in electricity market structure, state RES requirements, and ability to utilize resources, regional compliance surpluses or deficits may have differing price impacts, as shown in **Figure 4** for the RESNEC case. (A map of the

regions is shown in **Figure 5**.) There is a similar distribution in rate impacts across regions for the RESFEC case. In regions dominated by traditional cost-of-service regulation, the net cost increases or decreases from RES compliance are generally passed through to consumers; in regions with more open electricity market structures, these changes in costs will only be passed through to consumers to the extent that market forces allow, and will otherwise by absorbed by the industry. In cases where one region may be building dedicated renewable energy resources in an adjacent region, costs and benefits may be shared between the two regions, since the host region will realize the local economic benefits such as employment and land-owner payments – but also local costs such as any undesirable land-uses. The ownership region will receive any net proceeds from the operation and sale of renewable energy credits, and price impacts will tend to be in the ownership region.

Interactions Between the RES, the EERS, and the Cap-and-Trade Program for Greenhouse Gas Emissions in the ACESA Discussion Draft

EIA's modeling of the RES in the ACESA discussion draft was a standalone analysis that did not consider interactions with other key programs in the ACESA discussion draft. While EIA cannot develop an integrated analysis until we are able to develop clearer insights into how some of the other ACESA programs would actually be implemented, interactions among the elements of ACESA could be significant.

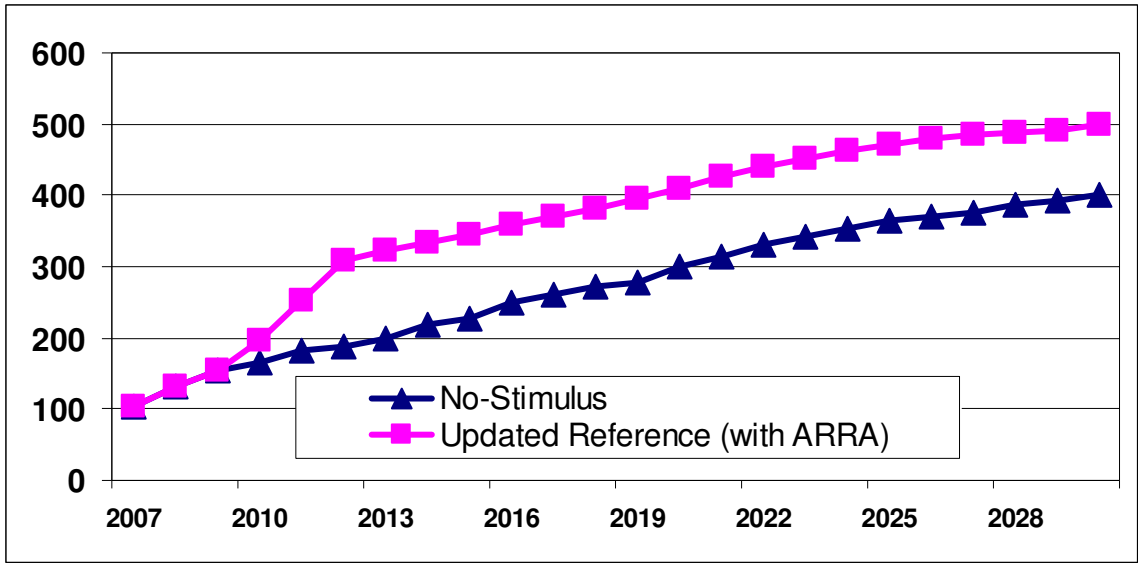
In previous analyses of economy-wide policies to limit or reduce emissions of greenhouse gases, EIA has generally found that a cap-and-trade program leads to significant growth in the use of renewable energy for electricity generation, which becomes more attractive when the cost of using fossil fuels goes up. Where there are

multiple targets that can be satisfied with the same energy resources and projects, the target that drives the highest use of those particular resources will generally absorb all of the incremental costs from those resources, making compliance with the non-binding target appear to be costless. To the extent that the proposed cap-and-trade program induces more renewable resources than required by the concurrent RES proposal, one might expect a reduction in incremental RES compliance costs, since those costs would already be reflected in the value of carbon dioxide allowances.

In contrast, an EERS, which reduces or eliminates projected growth in electricity load, and therefore the need for additional generation capacity, makes it more likely that a given RES target will require that generation from new eligible renewable capacity replace generation from existing capacity rather than from other types of new capacity. The cost penalty associated with backing out existing capacity, whose capital cost is already sunk, is typically much larger than the cost penalty associated with backing out alternative types of new capacity. The EERS in the ACESA discussion draft calls for a 15 percent reduction in load relative to the EERS baseline between 2012 and 2020, with further reductions beyond 2020 to be established through a rulemaking process. Although the relationship between the EERS baseline and the updated *AEO2009* reference case is far from clear, projected electricity demand growth in the updated *AEO2009* reference case, before application of an EERS, is only about 1.0 percent per year from 2008 through 2030. If the EERS program in fact leads to a significant reduction in projected demand growth relative to the updated *AEO2009* baseline, many regions would likely have little if any need for new capacity, so new generation from eligible renewables required to meet the RES target would be backing out generation from existing capacity.

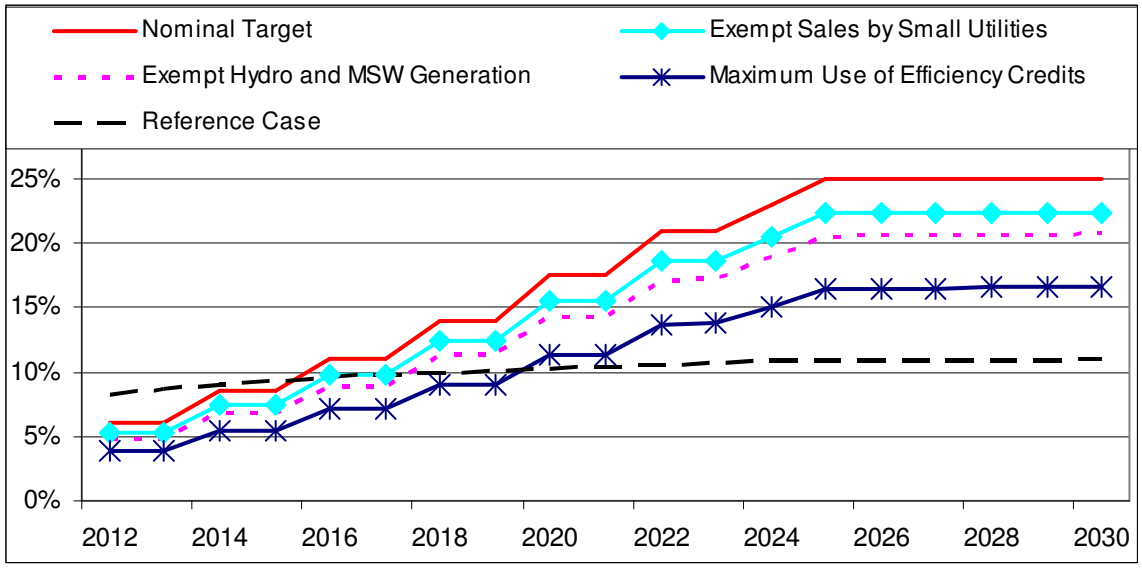
Mr. Chairman and members of the Committee, this concludes my testimony. I would be happy to answer any questions you may have.

Figure 1. Non-Hydroelectric Renewable Generation
(billion kilowatthours)



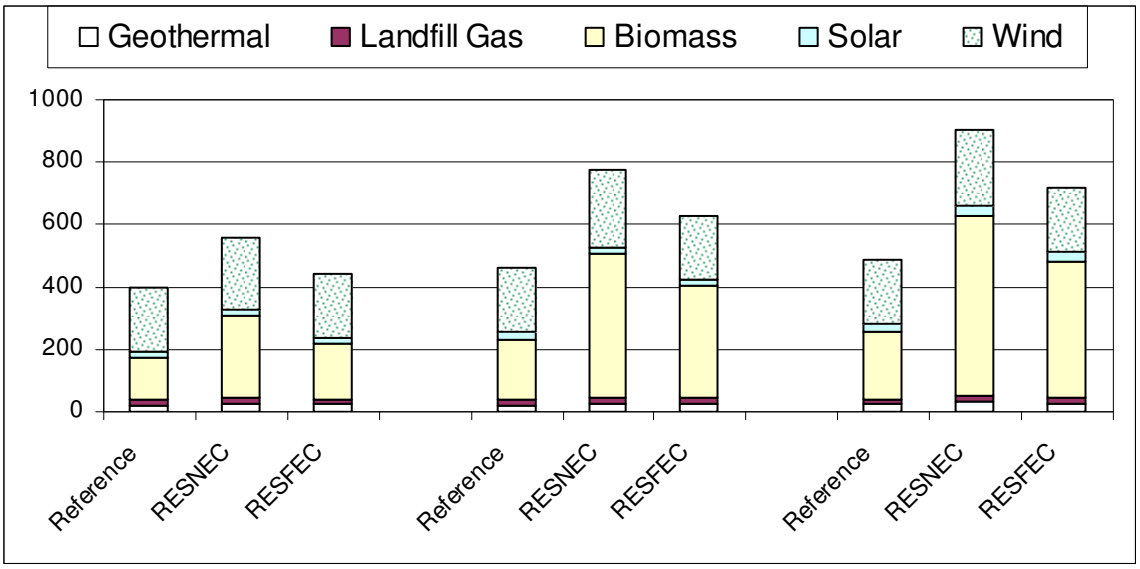
Source: Energy Information Administration, National Energy Modeling System runs STIMULUS.D041409A and NOSTIMLS.D041409A.

Figure 2. Share of Renewables Required Under the RES in the ACESA draft
(Share of total electricity sales)



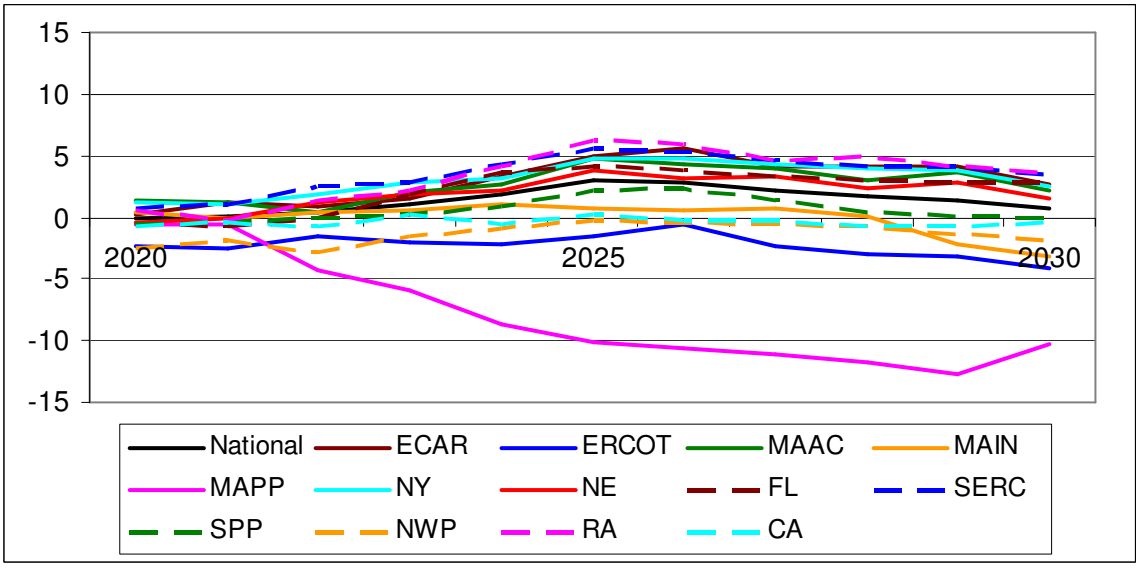
Source: Energy Information Administration calculations.

Figure 3. Generation by Fuel
(billion kilowatthours)



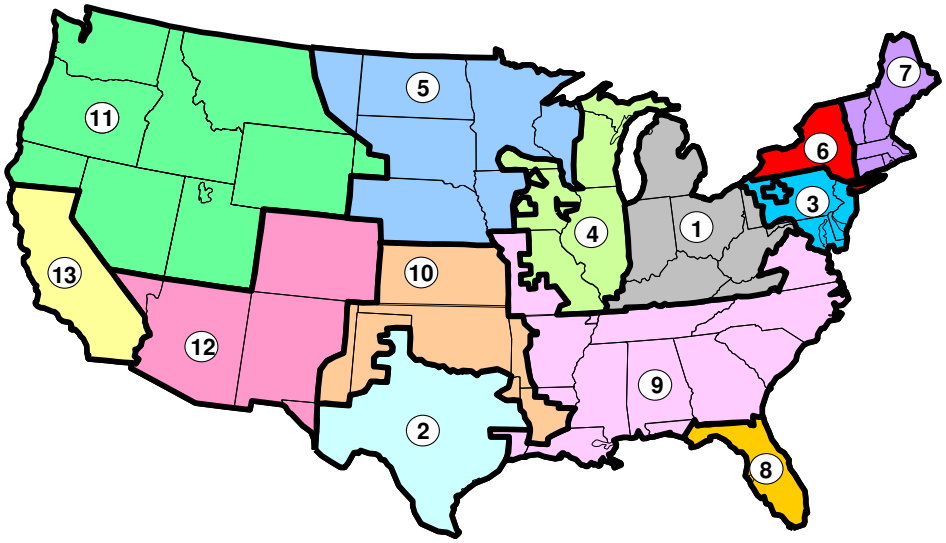
Source: Energy Information Administration, National Energy Modeling System Runs, STIMULUS.D041409A, WAXRPS.D041609A, AND WAXRPSNE.D041609A.

Figure 4. Percent Change in Electricity Price by Region – RESNEC Case Relative to Reference Case
(percent change)



Source: Energy Information Administration, National Energy Modeling System Runs, STIMULUS.D041409A AND WAXRPSNE.D041609A.

Figure 5. National Energy Modeling System Electricity Regions



1 East Central Area Reliability Coordination Agreement (ECAR)
2 Electric Reliability Council of Texas (ERCOT)
3 Mid-Atlantic Area Council (MAAC)
4 Mid-America Interconnected Network (MAIN)
5 Mid-Continent Area Power Pool (MAPP)
6 New York (NY)
7 New England (NE)
8 Florida Reliability Coordinating Council (FL)
9 Southeastern Electric Reliability Council (SERC)
10 Southwest Power Pool (SPP)
11 Northwest Power Pool (NWP)
12 Rocky Mountain Power Area, Arizona, New Mexico, and Southern Nevada (RA)
13 California (CA)

Source: Energy Information Administration